

CAROLINA NORTH

The UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL



Sustainable Design and Infrastructure Workshop #2
November 27-29, 2006



STONEBRIDGE

Today's Agenda

- Welcome
- Brief Introductions
- Brief Introduction
 - Project Description and Status
 - Project Schedule
 - Overview of Infrastructure
Workshops for Discovery Phase
- Agenda for this Workshop
- Overarching Themes from November 6-8 workshop
- Dialogue
- Review of Workshop Dialogues and Additional Opportunities
- Dialogue



Carolina North

Research and Innovation Campus

Corporate Partnerships

Faculty/Employee/Grad Housing

Service Retail/Commercial/Civic

Main Campus

Flagship Research University

Hospitals/Health Care Centers

Student Life and Housing

Mason Farm

Outreach

Recreation

Research

Project Description

- 979 acres, one mile north of main campus
- Past plans have been tabled; public LAC convened to propose guiding principles
- Enhance research and partnerships
 - A living-learning campus
 - Mixed-use academic community
 - Innovation and economic development
 - Sustainable campus
 - Integrated into the broader community
 - Academic and research clusters
 - Graduate student and employee/faculty housing
 - Service retail/commercial/civic
- Phased development



Project Schedule

Through March 2007

- Public Process through LAC to develop Guiding Principles
- UNC explores the possibilities and parameters for Sustainable Design & Infrastructure

Through May 2007

- Foundational Studies
 - Ecological Assessment (final 1/07)
 - Joint Transit Study (final 4/07?)
 - Fiscal Impact Study

March – October 2007

- Master Plan
- Phase 1 Site Plan
- Trustees approval and submittal to Towns

Through Summer 2008

- Site Development Guidelines
- Preliminary Utilities Analysis
- High Performance Building Standards



Infrastructure Workshops

Sustainable Design & Infrastructure Workshops

DISCOVERY PHASE

- November 6-8: Exploring Possibilities for Carolina North, Part 1
- **November 27-29: Exploring Possibilities for Carolina North, Part 2**
- December 12-14: Development of Parameters
- January 8-10: Presentation of Draft Results/ Technical Studies
- February: Technical Studies
- March: Technical Studies



Exploring the Possibilities Part 2

Monday, November 27

- Plenary Review Session

Tuesday, November 28

- 8:30 – 11:30 Transportation Work Group (Giles Horney Building, Magnolia Room)
- 11:45-3:45 Building Typology and Energy/Utilities Combined Work Groups (EHS Large Conference Room)

Wednesday, November 29

- 8:30-12:30 Landscape, Natural Habitat, Water Quality, Water, Stormwater, Wastewater (EHS Large Conference Room)
- 12:40-2:00 Worksession to Summarize Work Groups (EHS Large Conference Room)
- 2:00-4:00 Report out from Work Groups & Wrap-up (EHS Large Conference Room)



Exploring the Possibilities Workshop #1 Review



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DRAFT

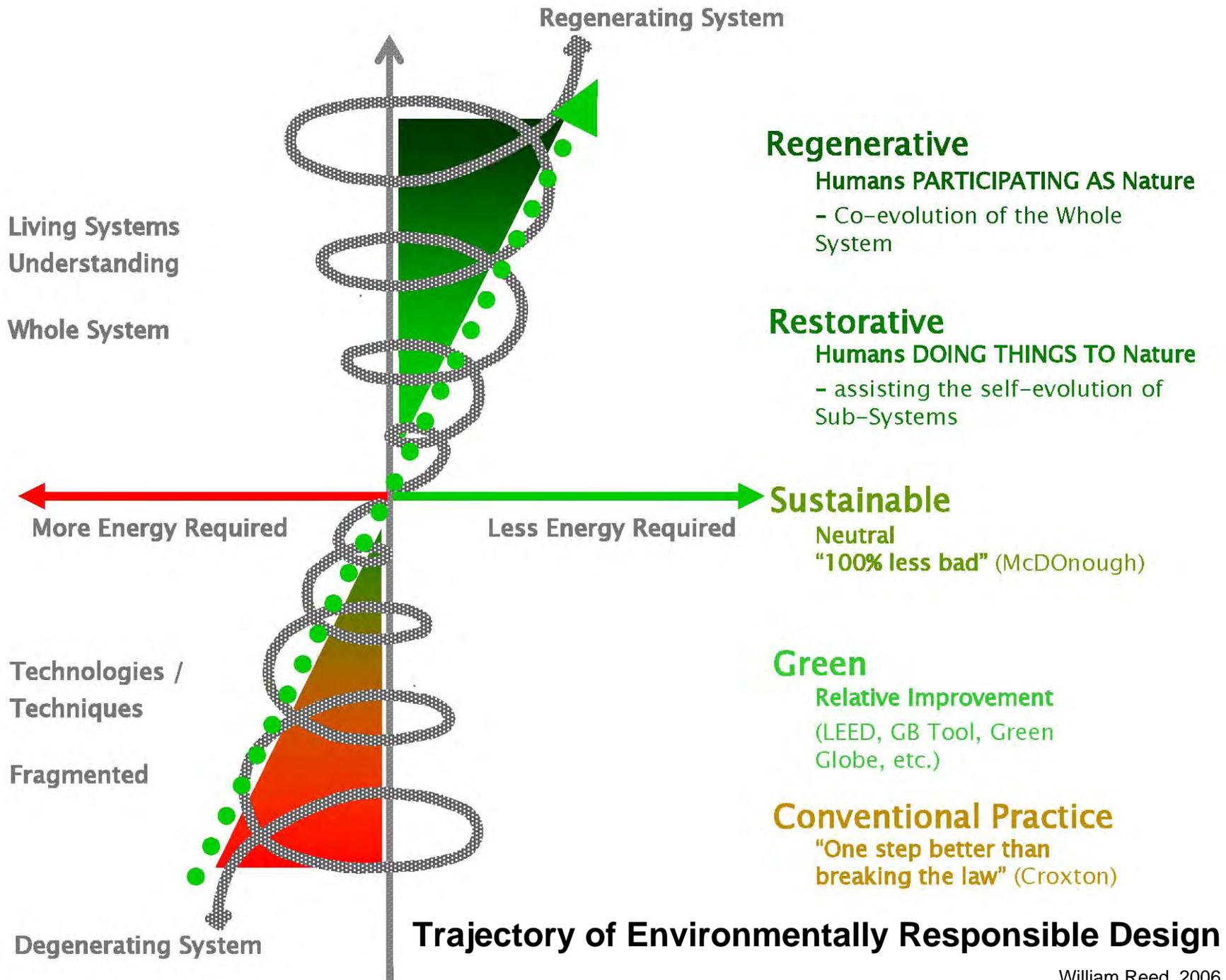
Overview of General Principles

*--developed by UNC Carolina North Core Team
and presented to LAC*

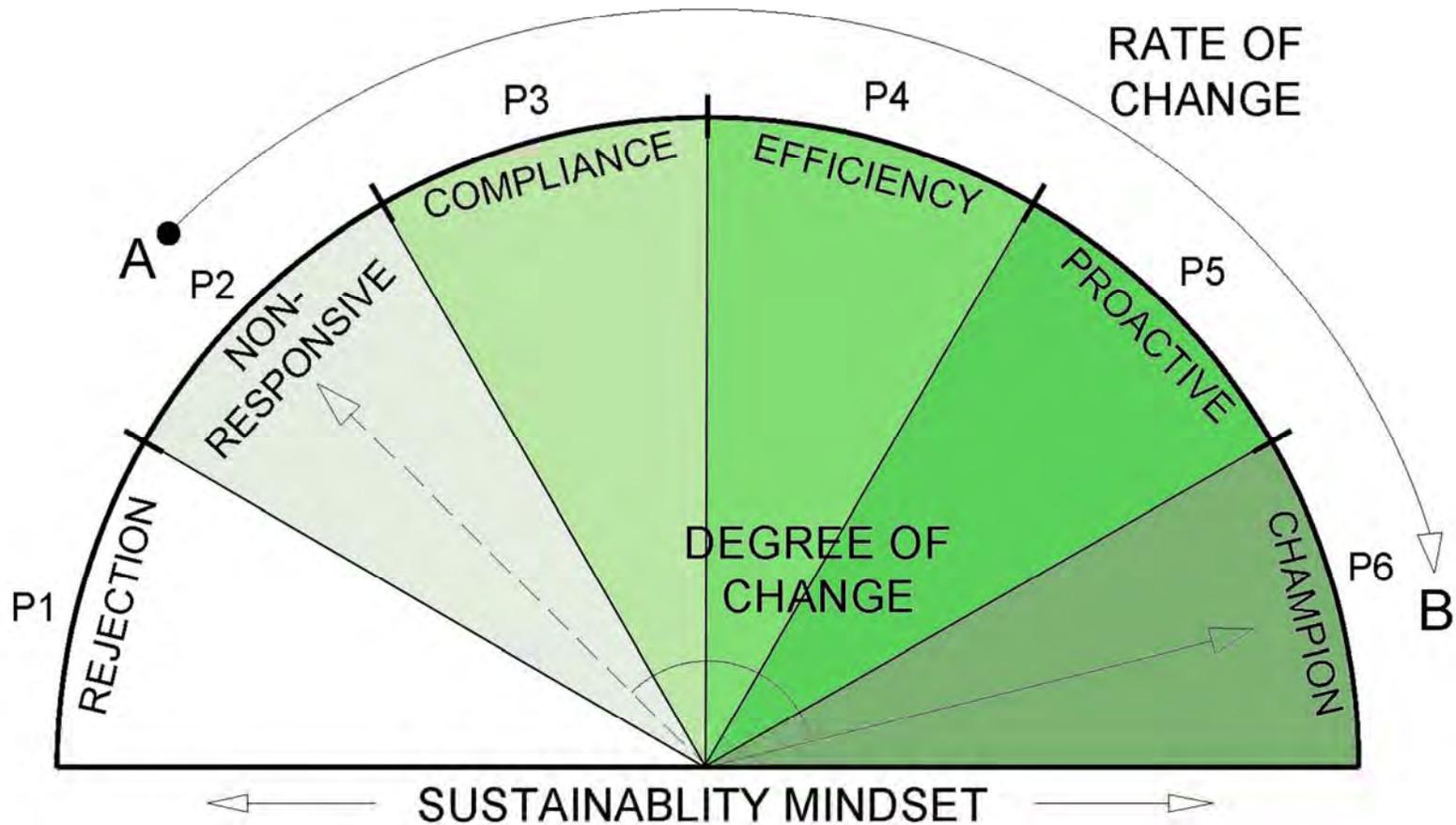
Carolina North will...

1. Support Carolina's Mission
2. Provide for Economic Progress
3. Create a Campus Environment to Enhance the University's Intellectual Climate and Relationship to Chapel Hill and Carrboro
4. Create a Model for Sustainability
5. Develop a Balance between Campus and Community





Mix of Deepening Knowledge



"Pivotal Experiences, Organizational Change & Champions for Sustainability" Josette M. Plaut, Brian Dunbar, James Folkestad, Colorado State University

Living Campus a Model for Sustainability

A Living Campus is designed to provide all of its own operating needs and not burden other systems beyond its borders

- Treat all wastewater on site
- People and Planet friendly transportation
- Treat water as a valuable resource
- Restore native habitat
- Treat buildings as species
- Design for human health and productivity
- Educate at every opportunity
- Plan based on resources
- Operate a climate neutral campus



Common Themes

- Carolina North is a rare and unique opportunity, its sense of place must be respected.
- Integrate sustainability measures as educational opportunities
 - University curriculum and research
 - Operations and maintenance
 - Post occupancy evaluations
 - Adopting CRED into lifestyle
- Desire for balance between central and local systems for energy, water and transportation
 - supply, capacity, and reliability of power
 - thermal utilities production
 - water delivery and treatment
 - service and drop off zones
- Comprehensive utility distribution corridor responding to buildings, landscape, transportation, and water needs.
 - serve the buildings
 - integrate with the landscape
 - responding to transportation
 - serviceability



Common Themes

- Balance of density and open space across all the five workgroups
- Minimizing the use of resources and systems for Carolina North that are non-renewable
- Develop a recycling and waste reuse management plan for materials, energy, water, and buildings.
- If the USGBC LEED program is to be a part of the process, it should be part the scope from start and adhered to through completion.
- Internal barriers exist that are controlled by UNC while external barriers will require collaboration with other entities.
- Solutions and design approaches will be phased allowing for adaptability and flexibility.
- Innovative approaches should be leveraged to attract funding sources.



Dialogue Time – 25 Min

Landscape, Natural Habitat, Water Quality



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Opportunities and Possibilities

- Integrate research and education into the landscape, habitat, and water quality features (e.g., visible stormwater BMPs, ecosystem restoration, planning and monitoring of biodiversity)
- Maintaining/enhancing community and ecosystem connectivity (for example through protection of Bolin Creek corridor and also through preserving forest connectivity)



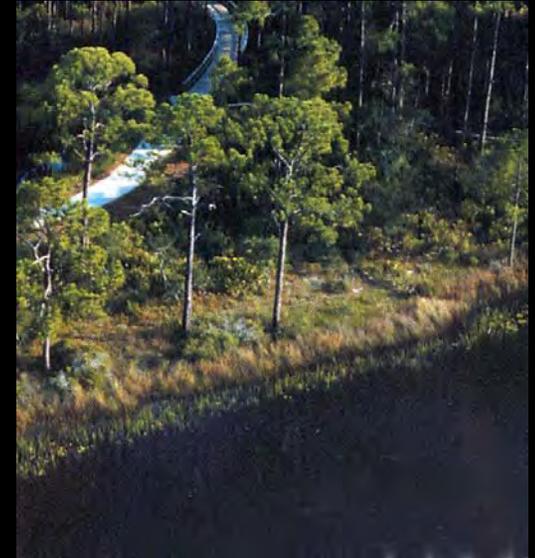
Opportunities and Possibilities

- Build on brownfields first with eye towards conserving greenfield areas. This is an important opportunity to restore existing impacted landscapes, habitat, and water quality
- Allow natural drainage to form stormwater management strategy. Emphasize capture-reuse-recycle approaches. Use natural areas to receive excess flows as sheet flow to filter and infiltrate.



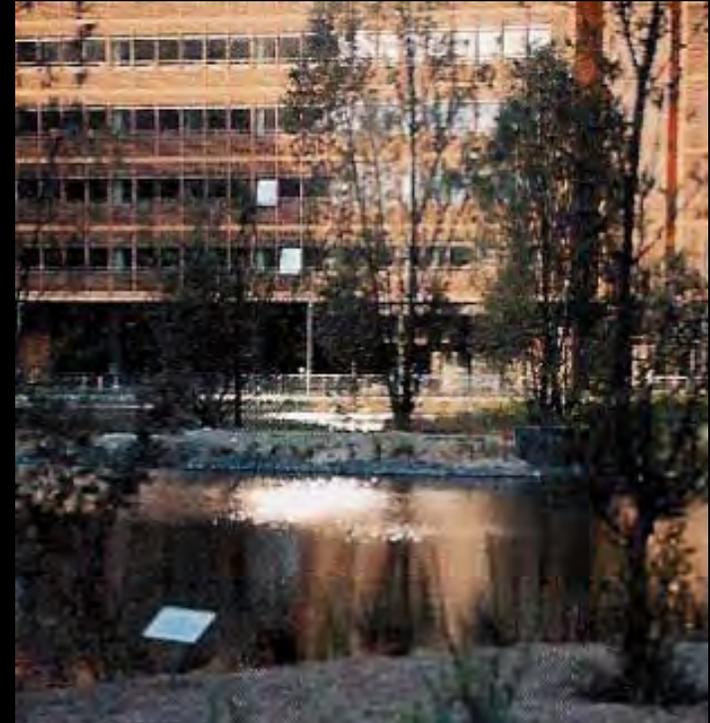
Opportunities and Possibilities

- Preserve viewscales and integrate ecological function throughout the built environment and create a natural and functional transition to the non-built environment.
- Identify existing site features that we want to celebrate and design for better access to experience their value.



Opportunities and Possibilities

- Create a space with more biodiversity than it has today. Understand and educate people that CN will look and feel different from the Main Campus.
- Allow natural site features to influence building siting and utility location.



Opportunities and Possibilities

- *Develop a conservation and restoration plan for the entire site that addresses protection of existing natural resources and ecological processes along with restoration initiatives focused on invasive species management, forest restoration, wildlife corridor enhancement, stream and wetland restoration and cultural/historical interpretation.*



Opportunities and Possibilities

- *Soil preservation – protect, enhance and restore native soil biotic and abiotic properties to support indigenous plant community growth, native soil fauna, enhance natural hydrologic process and support overall ecosystem function.*
- *Steep slope preservation – minimize erosion to protect habitat and reduce stress on natural water systems, by preserving steep slopes in a natural, vegetated state.*



Opportunities and Possibilities

- *Native vegetation – use native plant species for a healthy ecosystem that will conserve native wildlife, decrease the amount of water needed for landscape maintenance, reduce long-term maintenance, reduce soil erosion by production of long root systems, and protect water quality by controlling erosion and moderating floods and drought.*



Opportunities and Possibilities

- *Heat island reduction – reduce the heat island effect by preserving forest patches, reforesting areas, and planting street trees. Efforts should target minimizing impacts on microclimate, human and wildlife habitat and energy required for cooling.*



Opportunities and Possibilities

- *Hydrology— replicate the natural hydrologic function of the land.*
- *Construction – minimize site disturbance during construction by conserving natural areas, providing tree protection, minimizing soil compaction.*
- *Landscape maintenance – use IPM techniques to protect at risk ecosystems and non target species.*



Stormwater, Water & Sewer Systems



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Water, Wastewater, Stormwater

- Integrate research and planning/design
- Flexibility, adaptability in the master plan
- Explore funding opportunities for innovative systems
- Innovative technologies must integrate design, operations and maintenance
- Evaluate the need for redundancy and back-up systems
- Standardization of decentralized systems



Water, Wastewater, Stormwater

- Continue and expand the use of reclaimed water
- Limit use of potable water
- Treat wastewater on site
- Collect and re-use wastewater
- Collect and re-use stormwater
- Treat stormwater from off-site areas
- Utility corridor/tunnel; integrate with master plan



Internal Transportation, Parking & Roads



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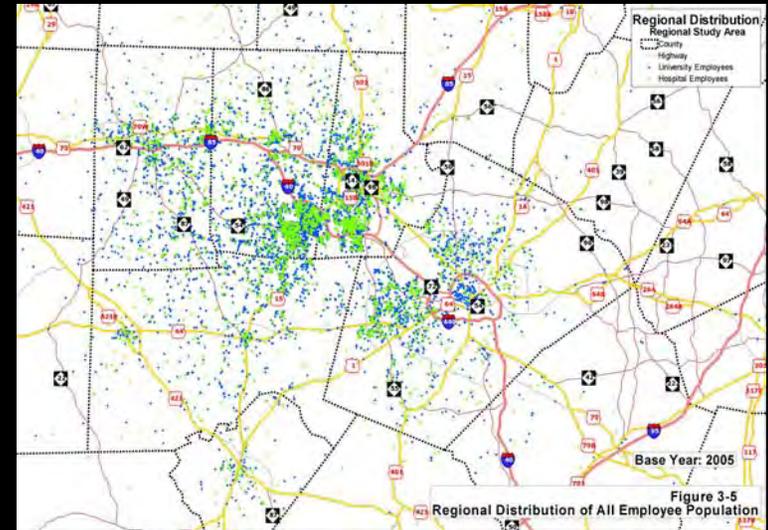
Background

- Site information
 - Site is about 2 miles end-to-end
 - Site is about 1 mile from Main Campus
 - Closest major road intersection is I-40 and Martin Luther King
 - Railroad provides opportunities
- Types of transportation needs
 - People
 - Workers
 - Residents
 - Visitors
 - Operations
 - Construction



General Considerations

- Think of transportation modes as carbon based and non-carbon based, emphasize non-carbon based
- Consider where people are coming from and going to
 - Has mode implications
 - Has site access implications
- Integrate with the greenway systems in Chapel Hill and Carrboro



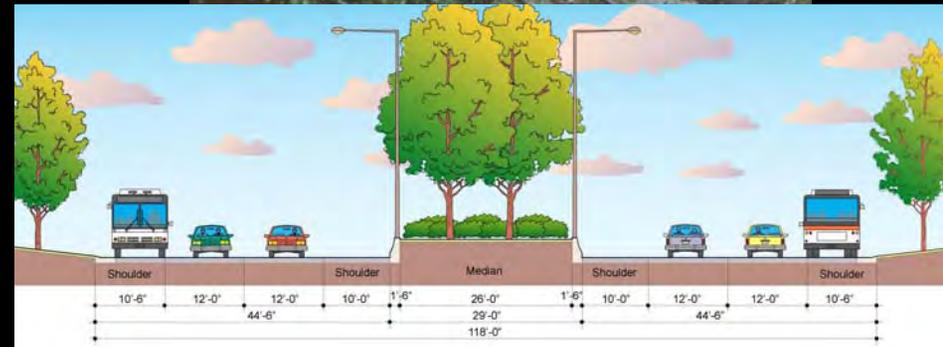
Land Use

- Need to develop proper land use design to support transit-oriented transportation system
 - High density mixed use supports transit
- What will the street system/urban design look like?
 - Grid versus traditional pedestrian campus
 - Different in different zones (residential, institutional, commercial)



Transit

- Design transit needs from Day #1
 - Railroad corridor ?
 - MLK?
- Future regional transit solutions unclear
 - MPOs are taking lead in developing vision
 - We need to look at a strategy that will integrate with a variety of potential regional outcomes
 - Leverage Carolina North plan to obtain state and federal funding
- Reserve right-of-way for transit corridors to site
- Local and regional transit penetrate site versus use shuttles for internal circulation



Flexibility

- How does the system evolve with the different phases of development?
- Provide flexibility for future technologies and unknowns
- Undertake scenario planning to understand and compare different futures
- Think 3 dimensional, e.g.,
 - put service and other supply lines underground
 - Grade separate major pedestrian crossings



Additional Items to Consider

- *Intelligent transportation systems*
- *Potential for streets to benefit wider community*
- *Protection of surrounding neighborhoods*
- *Site access/connections*
- *Parking*



Building Typology

How Buildings Behave



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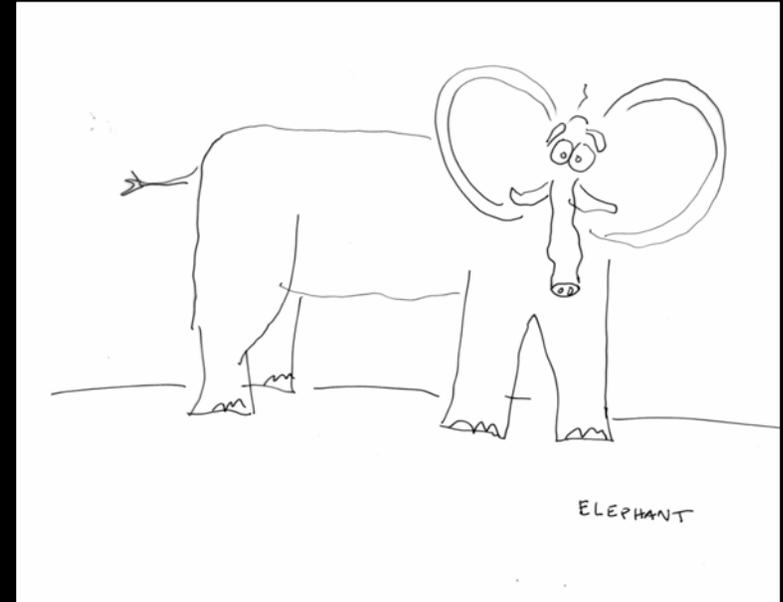
Building Typology Possibilities explored

- Building Types
- Response to Climate
- Baseline Design Standards
- Integration of Users
- Synergistic Building Types
- Pedagogical Opportunities
- Human Health and Productivity
- Adaptability
- Carbon Footprint
- A Living Building
- *Commissioning*
- *Operation & Maintenance*
 - *Measurement & Verification*
 - *Post Occupancy Evaluation and Implementation*



Potential Building Types for Carolina North

1. Administration
2. Computational
3. Classroom/Lecture
4. Mixed Land Use: retail, residential & office
5. Residential: medium density multi-family
6. Operation & Maintenance
7. Lab Building
 - *Wet*
 - *Dry*
8. Science Building
 - Chemistry-type
 - Biology/physical science
9. Public Use: Library, Auditorium
10. Utility Generation
11. *Recreation Facility*



The Laboratory

"fumehoodis openus"



ELEMENTS

BNIM

LABORATORY

Building Typology Workgroup Summary

- Treat buildings as species. Design as close as possible to having a positive impact, move beyond reduction strategies to restorative solutions
- Increase Human potential: provide spaces where occupants are comfortable and productive so that research breakthroughs can occur.
- A common goal we all share is to recruit and retain the best researchers, faculty and students. If we do that private sector will want to join us and bring research dollars.
- Additional benefits of high performance buildings are adaptability/flexibility, durability, maintainability, reduced emissions including carbon footprint and pedagogical opportunities



Building Typology Workgroup Summary

- Methodology: use free resources, design in efficiency, use best technology, then renewable systems and reuse waste.
- Educate about the benefits of high performance design including looking at life cycle cost and net present value not just first cost. Expand the options considered based on sound science and peer collaboration
- Educate project managers, eventual occupants, decision makers, governing boards, legislature, state agencies, community and local government
- Move from suggested guidelines to requirements developed from performance based criteria.
- Standardize design process regardless of project manager, funding stream or eventual occupants



Building Typology Workgroup Summary

- Use knowledgeable integrated design teams
- Invest in intensiveness of buildings strategically so systems are not oversized
- Incentivize decision making and appropriate behaviors
- Standardize systems to limit unique maintenance requirements
- *Commission all buildings for assurance that all systems are installed and operating as designed*
- *Organize and provide education for proper operation & maintenance of building systems.*
- *Measure and verify each building's resource uses over time*
- *Invest in post occupancy evaluations and implementation of findings into future projects*



Utility Infrastructure, Energy Generation & Consumption



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Opportunities

- Carbon Reduction – Minimize Greenhouse Gases
- UNC / TCH CRed Pledge – 60% Per Capita Reduction by 2050
- Alternative or Renewable Non-Carbon Based Fuel Sources
- Carolina North to be a Sustainable Campus
- Social Responsibility
- Maintain “Best in Class” Central Systems



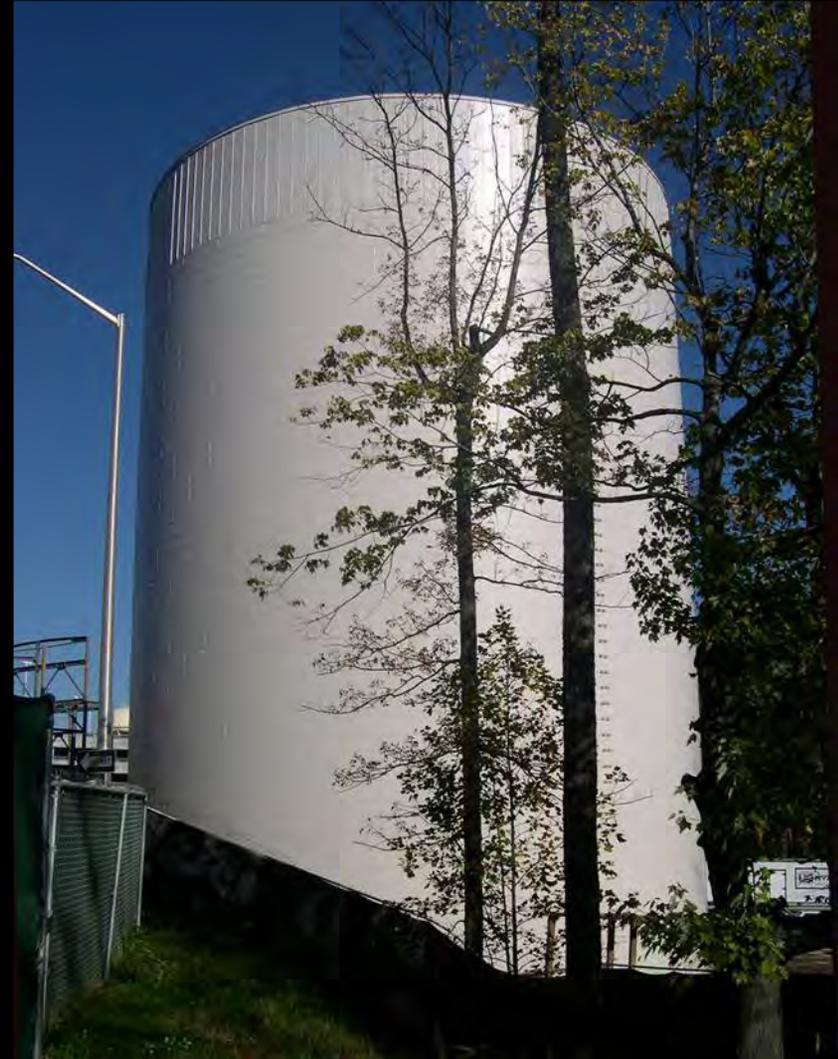
Hierarchal Approach

- Individual Building Level
- Highly Efficient Central Plants
- Opportunities to Reuse Excess Energy from Buildings through Plant



District Systems

- Takes Advantage of System Diversity and Reliability
- More easily Adaptable for Future Technologies
- Consider Standby Power as a Central Utility
- Hot Water is a Viable Alternative to Steam



Other Issues

- *Demand Side Management*
- *Net Energy Metering per Building*
- *Local Display of Building Energy and Systems Operation and Performance*
- *Education of Building Occupants*
- *Need to Study Distribution Methods*



11-27-06 Plenary comments/questions



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11-27-06 Plenary comments/questions

- “Be” a model of sustainability, not “create” a model...
- Handouts of the bullet points or posters during workgroups
- Traditional urban form vs. campus form; James Carnahan suggests a third form where infrastructure can be layered
- People may still drive to the campus but to what extent to light rail and transit systems have a place on this campus? Are they feasible? Integrate with other non-carbon based transportation...
 - Definitely not out of the question for intra-site movement
 - Current model is the park-n-ride; is there another way to move people to, from, on, and between campuses
- Add water consumption to building typology list (could fall under baseline design standards or O&M)
- Education of the occupants/users; how the building is used is really important to building performance
- Understanding other people’s experiences/innovations will make our job easier

- Possibly add building uses to current list (not confirmed by university)
 - public use or civic use
 - food service use
 - K-12 school use
 - Hotel use
 - Vivarium/animal facilities
 - Clinical uses/health care
- Need to discuss expectations for non-university buildings that will be built on the site
- Food service and child care and hotel will affect travel/trips—food on site will reduce number of trips for daily users

- How much to do you think this campus will attract volunteers for studies...facilities for these users...affects transportation
- Will we be looking at examples of building types (what they look like) or is it too early?
 - This process will look at high-performance building guidelines; the aesthetics will ultimately be left up to the individual designers
- Animal facilities/Vivarium (experimental or other uses) would require additional infrastructure and logistical support, waste, food, etc.
- “Use knowledgeable integrated design and construction teams” under BT workgroup summary

- Should we add “generate energy at the building level” and “limit energy consumption” into the hierarchal approach slide; not just central systems approach
- Look at free systems first, then on-site generation in buildings before central systems
- This project could be very urban and dense or very spread out—when do we talk about the plan and design of the development
- Need to analyze labor force needs to maintain central energy plant versus individual building energy generation system